

REMARKS

Applicant has amended claims 1, 3, 5, and 7 to replace "0.05-0.25 wt.% N" with "0.11-0.25 wt.% N," and to correct minor deficiencies. Support for the new lower limit 0.11 can be found in the Specification, page 9, Example 6. No new matter has been introduced.

Claims 1-8 are currently pending. Reconsideration of the application, as amended, is respectfully requested in view of the remarks below.

Rejection under 35 U.S.C. § 102(b)

Claims 1 and 2 are rejected under 35 U.S.C. 102(b) as being anticipated by Bjorkroth (U.S. Patent No. 3,700,851) or Hara *et al.* (JP 408246107A). Applicant traverses the Examiner's ground for rejection as follows.

Claim 1, as well as claim 2 dependent from it, is drawn to a martensitic stainless steel composition. The composition includes 0.5-6 wt.% W, 0.11-0.25 wt.% N, and other elements.

According to the Examiner, both Bjorkroth and Hara *et al.* disclose "martensitic stainless steel examples which meet the claimed composition. See Bjorkroth, alloy B, Table 1 of column 3; and Hara *et al.*, alloys 1, 2, 3, 8, and 11, Table 5 of columns 7 and 8" (the Office Action, page 2, lines 11-13).

Indeed, all alloys disclosed in both Bjorkroth and Hara *et al.* include 0.5-6 wt.% W. However, none of them contain 0.11-0.25 wt.% N, as required by amended claim 1, as well as claim 2. More specifically, the alloys disclosed in Bjorkroth contain 0.06-0.101 wt.% N, and the alloys disclosed in Hara *et al.* contain 0.02-0.1 wt.% N. Thus, the compositions of claims 1 and 2 differ from those disclosed in Bjorkroth and Hara *et al.* As a result, claims 1 and 2 are not anticipated by the references.

For the reasons set forth above, Applicant requests that this anticipation rejection be withdrawn.

Rejection under 35 U.S.C. § 103(a)

Claims 1-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bjorkroth, or Hara *et al.*, or Miyasaka *et al.* (JP 402217444A), or Kondo (JP 404120249A). Applicant again disagrees.

Among the rejected claims, claims 1, 3, 5, and 7 are independent. Claims 1 and 3 are drawn to martensitic stainless steel compositions, and claims 5 and 7 are drawn to methods of manufacturing the claimed steel. Each of them, as amended, recites a composition including, among others, 0.5-6 wt.% W (or its subset 0.5-4.5 wt.% W) and 0.11-0.25 wt.% N.

It is the Examiner's position that "[e]ach reference teaches a martensitic stainless steel alloy with constituents whose wt.% ranges overlap those recited by the claims" (emphasis added) See the Office Action, page 2, lines 26-27.

As discussed above, each of Bjorkroth and Hara *et al.* does not teach a steel composition containing a N content that overlaps "0.11-0.25 wt.% N," as recited in claims 1, 3, 5, and 7. Similarly, Kondo teaches a composition containing 0.005-0.1 wt.% N, which also does not overlap "0.11-0.25 wt.% N." Thus, the Examiner's assertion quoted above does not apply to Bjorkroth, Hara *et al.*, and Kondo. It only applies to the Miyasaka *et al.* reference. Miyasaka *et al.* discloses a composition containing an optional content of W and 0.01-0.15 wt.% N, overlapping, respectively, the W content and the N content recited in claims 1, 3, 5, and 7.

The Examiner argues that "[i]t has been held that one of ordinary skill in the art at the time the invention was made would have considered the claimed compositions to have been obvious because overlapping ranges in a composition is considered a *prima facie* case of obviousness ..." (the Office Action, the bridging sentence between pages 2 and 3). Applicant would like to point out that even if a *prima facie* case of obviousness has been made by the Examiner, it can be successfully rebutted by unexpected results shown in the Specification.

More specifically, the results from the experiments described in Examples 3, 6, and Comparative Example 4 were unexpected. See pages 9 to 10, Tables 1 and 2 of the Specification. Two compositions containing 1.1 wt.% W and 0 wt.% W were tested in Example 6 and Comparative Example 4, respectively. Unexpectedly, the hardness values for the compositions described in Example 6 and Comparative Example 4 were 429 Hv, and 302 Hv, respectively; and the yield strength values for those two compositions were 110.2 Kg/mm² and 78.0 Kg/mm², respectively. A skilled person in the art would not have expected that increasing the W content from 0 wt.% to 1.1 wt.% would increase hardness by 42% (i.e., from

302 Hv to 429 Hv) and increase yield strength by 41% (i.e., from 78.0 Kg/mm² to 110.2 Kg/mm²).

Furthermore, two compositions containing 0.08 wt.% N and 0.11 wt.% N were tested in Examples 3 and 6, respectively. Unexpectedly, the hardness values for the compositions described in Examples 3 and 6 were 392 Hv, and 429 Hv, respectively; and the yield strength values for those two compositions were 98.8 Kg/mm² and 110.2 Kg/mm², respectively. Again, an artisan would not have expected that increasing the N content from 0.08 wt.% to 0.11 wt.% would increase hardness by 10% (i.e., from 392 Hv to 429 Hv) and increase yield strength by 12% (i.e., from 98.8 Kg/mm² to 110.2 Kg/mm²).

Therefore, the compositions recited in claims 1, 3, 5, and 7 are non-obvious over the composition described in Miyasaka *et al.* (including overlapping W and N contents), let alone the compositions described in Bjorkroth, Hara *et al.*, and Kondo (not including an overlapping N content).

Based on the remarks set forth above, the rejection of claims 1, 3, 5, and 7 under 35 U.S.C. § 103(a) as being obvious over the references has been overcome, as well as claims 2, 4, 6, and 8 dependent from them.

CONCLUSION

For the reasons stated above, Applicant submits that the grounds for the rejections asserted by the Examiner have been overcome, and that the claims, as pending, define subject matter that is novel and nonobvious over the prior art.

Applicant submits that all of the claims are now in condition for allowance, which action is requested. Pursuant to 37 CFR §1.136, applicant hereby petitions that the period for response to the action dated September 27, 2001, be extended for two month to and including February 27, 2002.

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Enclosed is a check for \$ 400 for the required fee. Please apply any other charges or credits to Deposit Account No. 06-1050.

Respectfully submitted,

Date: 2-27-02

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the claims:

Claims 1, 3, 5, and 7 have been amended as follows:

1. (Amended) A martensitic stainless steel [comprises] comprising less than 0.06 wt.% C, less than 2.5 wt.% Si, less than 2.5 wt.% Mn, 1.0-6.0 wt.% Ni, 10.0-19.0 wt.% Cr, 0.5-6.0 wt.% W, less than 3.5 wt.% Mo, less than 0.5 wt.% Nb, less than 0.5 wt.% V, less than 3.0 wt.% Cu, [0.05-0.25] 0.11-0.25 wt.% N, and the remainder being Fe and minor impurities.

3. (Amended) A martensitic stainless steel [comprises] comprising less than 0.035 wt.% C, less than 2.0 wt.% Si, less than 2.0 wt.% Mn, 1.5-4.5 wt.% Ni, 12.0-16.0 wt.% Cr, 0.5-4.5 wt.% W, less than 2.5 wt.% Mo, less than 0.3 wt.% Nb, less than 0.3 wt.% V, less than 2.0 wt.% Cu, [0.08-0.20] 0.11-0.25 wt.% N, and the remainder being Fe and minor impurities.

5. (Amended) A method for manufacturing a martensitic stainless steel comprising the steps of:

casting a stainless steel that comprises less than 0.06 wt.% C, less than 2.5 wt.% Si, less than 2.5 wt.% Mn, 1.0-6.0 wt.% Ni, 10.0-19.0 wt.% Cr, 0.5-6.0 wt.% W, less than 3.5 wt.% Mo, less than 0.5 wt.% Nb, less than 0.5 wt.% V, less than 3.0 wt.% Cu, [0.05-0.25] 0.11-0.25 wt.% N, and the remainder being Fe and minor impurities; and

submitting the cast stainless steel to an austenization heat treatment at a temperature of 800-1150°C and/or tempering the stainless steel at a temperature of 350-575°C.

7. (Amended) A method for manufacturing a martensitic stainless steel comprising the steps of:

casting a stainless steel that comprises less than 0.06 wt.% C, less than 2.5 wt.% Si, less than 2.5 wt.% Mn, 1.0-6.0 wt.% Ni, 10.0-19.0 wt.% Cr, 0.5-6.0 wt.% W, less than 3.5 wt.% Mo, less than 0.5 wt.% Nb, less than 0.5 wt.% V, less than 3.0 wt.% Cu, [0.05-0.25] 0.11-0.25 wt.% N, and the remainder being Fe and minor impurities;

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mechanically-processing the stainless steel such that work hardening is generated in the stainless steel; and

submitting the mechanically-processed stainless steel to an austenization heat treatment at a temperature of 800-1150°C and/or tempering the stainless steel at a temperature of 350-575°C.